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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/590,671	06/01/2007	Jianzhong Zhang	873.0157.U1(US)	2837

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EXAMINER

NGUYEN, LEON VIET Q

ART UNIT	PAPER NUMBER
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2611

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/590,671	Applicant(s) ZHANG ET AL.	
	Examiner LEON-VIET Q. NGUYEN	Art Unit 2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 July 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17, 20 and 21 is/are pending in the application.
 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 10-12, 20 and 21 is/are allowed.
- 6) ☒ Claim(s) 1-9, 13, 15 and 16 is/are rejected.
- 7) ☒ Claim(s) 14 and 17 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 August 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>7/15/09</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This office action is in response to communication filed on 7/15/09. Claims 18 and 19 have been cancelled. Claims 1-17, 20 and 21 are pending on this application.

Response to Arguments

2. Applicant's arguments filed 7/15/09 have been fully considered but they are not persuasive.

Response to Remarks

Regarding claim 1, applicant asserts that Visotsky does not teach a first input coupling to a first receive antenna and a second input for coupling to a second receive antenna (Remarks page 12 first paragraph).

While examiner agrees that Visotsky teaches only a single receive antenna in fig. 4, Visotsky does teach a rake receiver (fig. 2) with two separate receivers (201 and 203 in fig. 2). Rake receivers are well known to be used in multiple antenna configurations where each of the rake fingers is connected to an antenna (see fig. 4 of Braun, US20030043892, which is not relied upon in the rejection but merely referenced to show the state of the art). Therefore, although Visotsky does not explicitly teach a first and second receive antenna, one of ordinary skill in the art would have found it obvious to use multiple antennas according to an antenna diversity configuration, which was well-known at the time of the filing of applicant's application.

Also regarding claim 1, applicant asserts that the spread spectrum symbols come from a transmitter having at least a first and a second transmit antenna (Remarks page 12 first paragraph).

Examiner agrees, however the argument is moot in view of the new grounds of rejection.

Further regarding claim 1, applicant asserts that Visotsky fails to teach an estimated symbol sum that is generated from signals received from a first transmit antenna and a second transmit antenna of a transmitter (Remarks page 12 third and last paragraphs).

Examiner agrees, however the argument is moot in view of the new grounds of rejection.

Regarding claims 15, applicant asserts that the received signals come from a first and second transmit antenna (Remarks page 13 fourth and sixth paragraphs).

Examiner agrees, however the argument is moot in view of the new grounds of rejection.

Information Disclosure Statement

3. The information disclosure statement (IDS) submitted on 7/15/09 was filed after the mailing date of 7/15/09. The submission is in compliance with the provisions of 37

CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 2, 4, 7, 9, 13, 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Visotsky et al (US6175588) in view of Liang et al (US6314147) and Choi et al (US7136410).

Re claim 1, Visotsky teaches a receiver (fig. 2) comprising a first input for coupling to a first antenna (receiver 301 in fig. 2) and a second input for coupling to a second antenna (receiver 203 in fig. 2) for receiving at least two spread spectrum symbols from a transmitter (fig. 4), comprising:

a first data path (the output of 208 in fig. 2) for generating a first estimated symbol $a_1(f)$ from said first input (col. 11 lines 23-25); and

a second data path (the output of 218 to combiner 228 in fig. 2) for generating an estimated symbol sum $a_s(f)$ from said first and second inputs (fig. 2).

Although Visotsky teaches a single receiver, RAKE receivers are well known to be used in MIMO and antenna diversity systems. One of ordinary skill in the art would realize the benefit of having multiple transmit and receive antennas to increase the

Art Unit: 2611

bandwidth and throughput of a system. As stated in the response to the remarks above, rake receivers are well known to be used in multiple antenna configurations where each of the rake fingers is connected to an antenna

Visotsky fails to teach an interference cancellation module having inputs coupled to the first and second data paths, said interference cancellation module for canceling co-channel interference (CCI) between the estimated symbol sum and the first estimated symbol to generate a second estimated symbol.

However Liang teaches an interference cancellation module (CCI canceller 120 in fig. 2) having inputs coupled to a first and second data paths ($X_{1,k}$ and $X_{2,k}$ in fig. 2) , said interference cancellation module for canceling co-channel interference between signal samples (col. 7 lines 4-11).

Therefore taking the combined teachings of Visotsky and Liang as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the feature of Liang into the apparatus of Visotsky. The motivation to combine Liang and Visotsky would be to provide improved processing of a received signal (col. 3 lines 33-36 of Liang).

Visotsky also fails to teach wherein the transmitter has at least a first and second transmit antenna; the first and second paths are coupled to said first and said second inputs; generating a first estimated symbol received from the first transmit antenna; and

Art Unit: 2611

generating an estimated symbol received from both the first and second transmit antenna.

However Choi teaches wherein a transmitter has at least a first and second transmit antenna (fig. 1, col. 4 lines 32-38); the first and second paths are coupled to said first and said second inputs (fig. 2, the upper and lower branches); generating a first estimated symbol received from the first transmit antenna (310 in fig. 2); and generating an estimated symbol received from both the first and second transmit antenna (700 in fig. 2).

Therefore taking the combined teachings of Visotsky and Choi as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the feature of Choi into the apparatus of Visotsky. The motivation to combine Choi and Visotsky would be to provide interference suppression in a multipath fading channel environment (col. 2 lines 7-11 of Choi).

Re claim 2, the modified invention of Visotsky teaches a receiver wherein said first and second data paths (fig. 2 of Visotsky) each comprise a separate chip equalizer (equalizers 204 and 214 in fig. 2 of Visotsky).

Re claim 4, the modified invention of Visotsky teaches a receiver wherein said second data path comprises a chip equalizer (equalizer 214 in fig. 2 of Visotsky) for

Art Unit: 2611

generating an estimated chip sum sequence from said first and second inputs (fig. 2 of Visotsky).

Re claim 7, the modified invention of Visotsky teaches a receiver wherein said receiver comprises a LMMSE receiver (LMMSE filter 140 in fig. 2 of Liang).

Re claim 9, the modified invention of Visotsky teaches a receiver wherein said second data path additionally comprises a unit for performing symbol detection (demodulator 218 in fig. 2 of Visotsky) of an estimated chip sum sequence (the output of 216 in fig. 2 of Visotsky) to generate said estimated symbol sum (col. 11 lines 49-51 of Visotsky).

Re claim 13, all of the claim limitations have been analyzed and rejected with respect to claim 1.

Re claim 15, all of the claim limitations have been analyzed and rejected with respect to claim 1.

Re claim 16, the modified invention of Visotsky teaches a wireless receiver wherein said first data path comprises a first chip equalizer for generating an estimated chip sequence from said first antenna (equalizer 204 in fig. 2 of Visotsky).

3. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Visotsky et al (US6175588), Liang et al (US6314147) and Choi et al (US7136410) in view of Diloisy (US7266355).

Re claim 3, the modified invention of Visotsky fails to teach a receiver further comprising a channel estimator having outputs coupled to inputs of each of said separate chip equalizers.

However Diloisy teaches a receiver (fig. 3) comprising a channel estimator (estimator 240 in fig. 3) having outputs coupled to inputs of each of said separate chip equalizers (equalizers 230 in fig. 3).

Therefore taking the modified teachings of Visotsky, Choi and Liang with Diloisy as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the feature of Diloisy into the apparatus of Visotsky, Choi and Liang. The motivation to combine Diloisy, Liang, Choi and Visotsky would be to reduce calculation load (col. 2 line 66 – col. 3 line 1 of Diloisy).

4. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Visotsky et al (US6175588), Liang et al (US6314147), and Choi et al (US7136410) in view of Fukasawa et al (US5533012).

Re claim 5, the modified invention of Visotsky fails to teach a receiver wherein the interference cancellation module operates using less than all active spreading codes in the system in which the receiver operates.

However Fukasawa teaches an interference cancellation module which operates using less than all active spreading codes in a system (abstract, the spreading code is divided into two parts. It would be obvious to use one of those parts for interference cancelling in device 104 in fig. 1).

Therefore taking the modified teachings of Visotsky, Choi and Liang with Fukasawa as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the feature of Fukasawa into the apparatus of Visotsky, Choi and Liang. The motivation to combine Fukasawa, Liang, Choi and Visotsky would be to cancel interference (col. 2 lines 1-4 of Fukasawa).

Re claim 6, the modified invention of Visotsky teaches a receiver wherein the interference cancellation module operates using only spreading codes of estimated symbols that are output to a decoder (col. 16 lines 1-11 of Visotsky).

Art Unit: 2611

5. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Visotsky et al (US6175588), Liang et al (US6314147) and Choi et al (US7136410) in view of Wang et al (US2020039391).

Re claim 8, the modified invention of Visotsky fails to teach a receiver wherein the receiver comprises a Kalmann Filter receiver.

However Wang teaches a receiver comprising a Kalmann Filter receiver (¶0051, ¶0057).

Therefore taking the modified teachings of Visotsky, Choi and Liang with Wang as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the feature of Wang into the apparatus of Visotsky, Choi and Liang. The motivation to combine Wang, Liang, Choi and Visotsky would be to facilitate improved performance of a receiver (¶0005 of Wang).

Allowable Subject Matter

6. Claims 14 and 17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

7. Claims 10-12, 20 and 21 are allowed.

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

Art Unit: 2611

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LEON-VIET Q. NGUYEN whose telephone number is (571)270-1185. The examiner can normally be reached on Monday-Friday, alternate Friday off, 7:30AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David C. Payne can be reached on 571-272-3024. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2611

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Leon-Viet Q Nguyen/
Examiner, Art Unit 2611

/David C. Payne/
Supervisory Patent Examiner, Art Unit 2611